

New employment technologies

The benefits of implementing services within an enterprise architecture framework



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ABSTRACT

Public employment services (PES) offer tools through different channels to both employers and job seekers. The multiplicity of services and channels, paired with processes that are sometimes inadequately mapped, creates challenges when implementing digital systems. This document discusses how using enterprise architecture can provide a framework for defining and representing a high-level view of the organization's processes and its information technology (IT) systems, as well as their relationship with different parts of the organization and external entities.* Having a strategic vision and a high-level design allows implementing systems in phases and modules to organize services to improve their efficiency and effectiveness. This document aims to support policy makers, managers and officials working with employment policies in understanding the benefits of implementing a comprehensive digital transformation in institutions within the framework of a strategic tool such as enterprise architecture.

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Public employment services (PES) face the challenge of improving their services in a context in which citizens and companies are looking for quality and efficiency. Those who use employment services, both public and private, are looking for services that minimize inefficiencies. In that sense, when PES use manual processes and rely on paper, it is easy to generate disenchantment among users and disincentives for the private sector to register vacancies.¹

Modernizing a PES, or any associated service, requires understanding the previous steps to start implementing systems. It is in order to determine these prior steps and to define the best modernization process that enterprise architecture can be used as a strategic tool. Establishing a labor intermediation system requires complementary services and sharing information, which makes it necessary to use appropriate technologies.² Furthermore, technology can also reduce the impact on the environment and improve access to services for people with disabilities (PwD)³ or those who live far from PES offices. For example, using artificial intelligence (AI) in a PES can be the basis for coordinating services with the private sector and providing them with the necessary technology to complement information and implement the appropriate policies in the labor market.

According to their definition, PES “plan and execute many of the active labor market policies used to help workers find jobs and companies fill vacancies,

1. Manual processes can also generate mistrust in the way candidates are selected. This is because manual processes are more prone to unintentional human error.

2. The benefit of having vacancy information from private and public employment services is cost savings when defining effective labor policies and guiding job training systems to generate the right skills. For more information on the benefits of these technologies see Urquidí and Ortega, 2020.

3. When implementing technology in social services it is key to ensure the same accessibility for PwD. For information on good accessibility practices see: <https://www.w3.org/standards/webdesign/accessibility>.

as well as facilitate labor market adjustments and cushion the impact of economic transitions.”⁴ In particular, PES offer services for those job seekers whose profiles are not part of the target group of private employment services or “head hunters,” as well as for job seekers who require additional support.

Quality services are associated with a digital transformation process. The PES transformation process ranges from eliminating manual processes to automation, online management and incorporating new technological elements such as AI,⁵ data science, robotization, cloud services,⁶ automatic learning and the Internet of things (IOT).⁷ Self-management, online procedures, automation, systems interoperability and pertinent, predictive and timely⁸ information are some of the tools that traditional services require to respond to the more demanding users.⁹

Digital transformation is a continuous process, which can easily become complex due to the involvement of several parties. Having a high-level architecture allows setting priorities and having a modular implementation. This translates into dividing a project into stages to make it more manageable. It also makes it easy to achieve quick results, generate efficiencies in the use of funds and avoid needing to redesign processes for not having considered some functionality in the beginning.

4. BID, AMSPE, OECD (2015).

5. More information on using artificial intelligence for labor intermediation is available in Urquidí and Ortega. (2020).

6. For best practices in contracting cloud services, see: García et al, (2020).

7. In the public management arena, the IoT can be used in multiple activities ranging from obtaining input information to defining training needs. See, for example, <https://u-gob.com/internet-de-las-cosas-iot-en-gobierno-9-aspectos-para-implantarlo/>

8. The Internet of things presents alternatives for use in public management. See <https://u-gob.com/internet-de-las-cosas-iot-en-gobierno-9-aspectos-para-implantarlo/>

9. CEPAL (2011).

In virtue of the previously stated, it is essential to pay attention to the design and implementation strategy of products, processes and technology before IT developments begin. Thus the importance of a plan that aligns the components of technological infrastructure and information and management systems with business objectives—the foregoing ensuring scalability, flexibility and connectivity with other existing systems.

In this process, the enterprise architecture serves as a strategic tool to focus these interactions and synergies, as well as to understand the relationship between an institution's processes.¹⁰ Enterprise architecture provides a high-level view of processes and their information technology (IT) systems, as well as their interrelation, in which processes and systems are shared by different parts of the organization.¹¹ Enterprise architecture also includes a strategic and functional survey of the institution, a gap analysis with existing systems and a mapping of information systems and computer infrastructure.

As an example, think of two services within a Ministry, one for job seekers and the other for the registration of employers. Being in different offices, both have service systems and self-management portals, generating separate and isolated records from each other. The result translates into the company's need to register again when it wants to register vacancies, even though all of its information is already in a Ministry system, which doubles the execution and maintenance costs of highly compatible systems. Linking the systems with a unified process could generate savings and offer a single view of citizen interactions and available services.

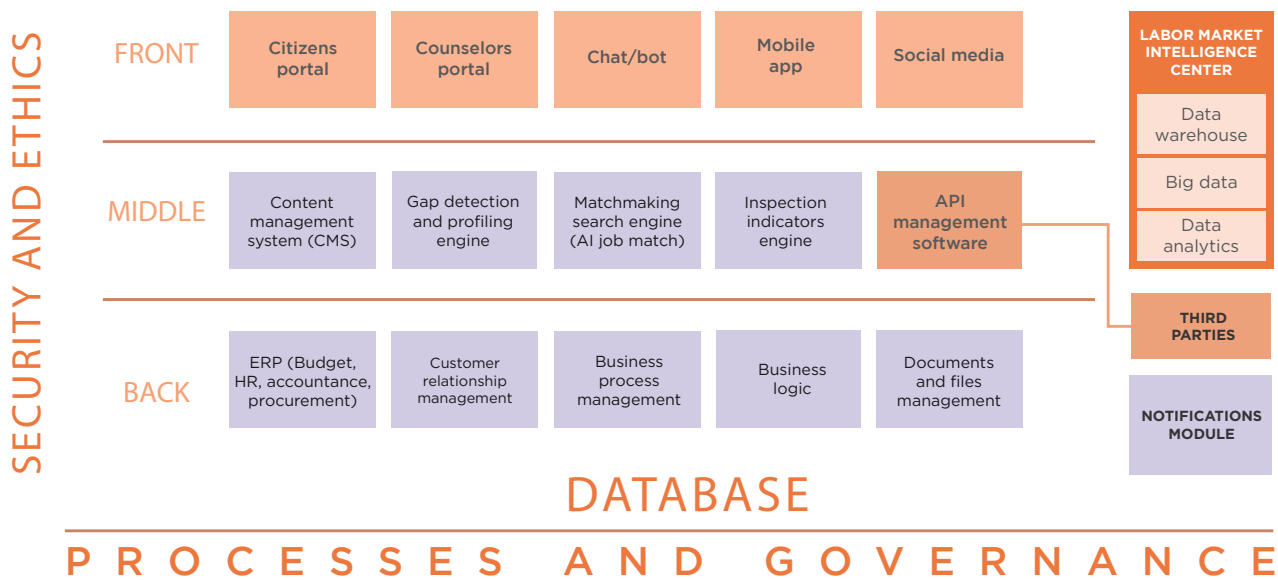
10. For the purposes of this publication, a user is digital when he/she regularly uses a digital product or service.

11. From 2017 to 2021, the authors worked with several SPEs in Latin America to understand their processes. One of the constants was that by bringing together different areas, the information produced by one of them was used by another, and that with small adjustments in their process it would be possible to generate efficiencies for several areas. It is in this context that enterprise architecture began to be used as a tool to locate synergies and correlations.

FUNDAMENTALS OF ENTERPRISE ARCHITECTURE

Enterprise architecture refers to the design of the structure of a system.¹² This involves the process of defining a structured solution that meets all technical and operational requirements, while optimizing common quality attributes such as performance, safety and reusability. Enterprise architecture involves a series of decisions based on a range of factors, each of which can impact the quality, performance, ease of maintenance and success of the system.

FIGURE 1: EXAMPLE OF A HIGH-LEVEL ARCHITECTURE DESIGN



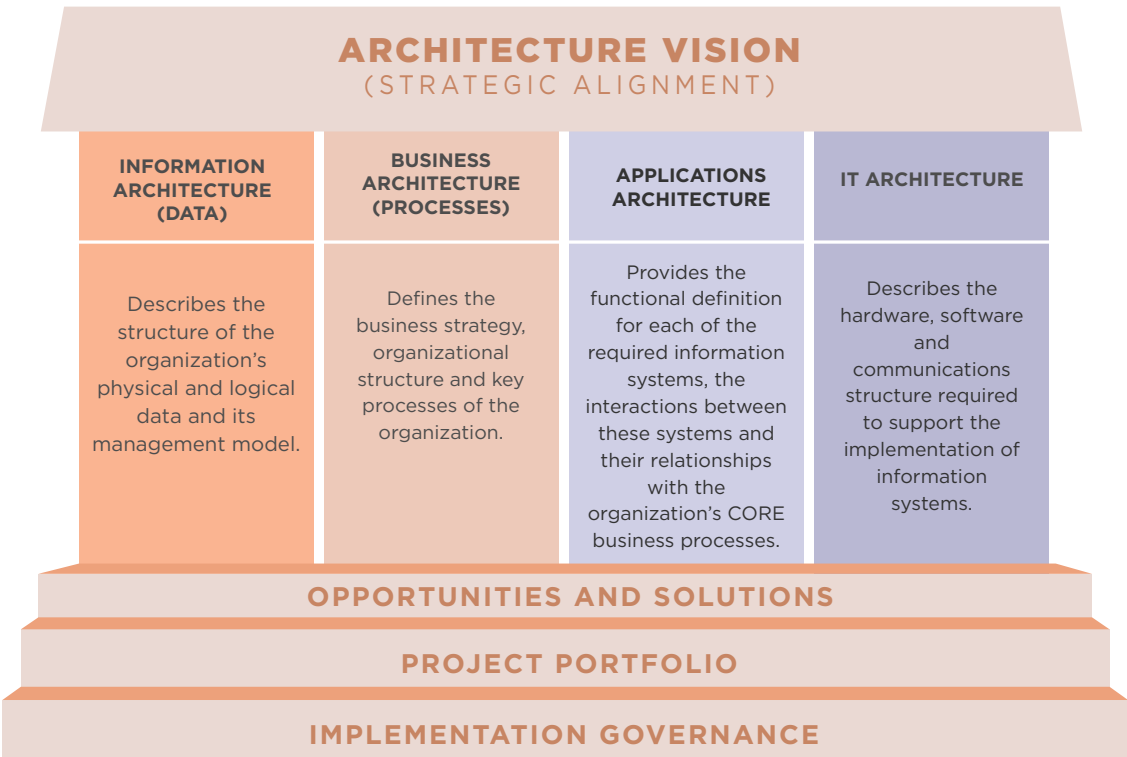
SOURCE: SELF ELABORATION

Enterprise architecture allows executing programs and projects with adequate governance. This makes deploying modules easier over time, reusing already installed parts within the framework of a roadmap with

priorities and times aligned to the objectives of the PES. Likewise, achieving quick wins is possible, followed by modules with a clear visibility of priorities, times and financial resources, which, as they are implemented, generate functionalities and consistent, timely and comprehensive data.¹³

Enterprise architecture covers a discipline of analysis in four main dimensions: information (data), business (processes), applications and technology (IT) as detailed below:

FIGURE 2 ENTERPRISE ARCHITECTURE LAYERS AND DEFINITIONS



SOURCE: THE OPEN GROUP

The information or data architecture analyzes the internal and external data flow, ensuring its integrity throughout the processes. Then there is the business or process architecture, which covers the end-to-end design of

13. TOGAF standard V. 9.2.

the services provided by PES. The application architecture establishes the required information and management systems components. Finally, the technological architecture defines the infrastructure requirements necessary to support the software components, platforms and services defined in the application architecture. All of the above happens in line with the objectives and mission of the PES.

Enterprise architecture generates multiple benefits when it is executed as part of the implementation of technologies.¹⁴ Among the main ones are:

- **It generates agility and quality of service for citizens and companies.** Having systems that reuse information ensures citizens do not have to hand over their information each time they start a new procedure, but only to authorize the use of this information.
- **It reduces costs for institutions and citizens** by incorporating technological standards that can be reused multiple times, such as unique customer service systems that provide services to all vice-ministries and related institutions, and with specific parameters for each vice-ministry, which allow personalized attention to citizens with the same tool. This results in lower costs of information systems; lower implementation, training and adoption efforts; and lower costs of consolidated data generation.
- **It achieves greater transparency and reliability of data,** as well as indicators through their proper design and management.

14. The enterprise architecture framework allows for a high-level design of processes and systems and is in that sense a strategic tool. Its objective is not to define a future state or goals of the entity, but to complement tools that allow it to strategically analyze the future mission or vision of the entity and to align processes and changes.

- **It provides support to the online government or Digital Government strategy.** An example is the creation of online procedures or the facilitation of access to PES for people with disabilities (PwD) and other vulnerable groups.
- **It prompts sustainability over time** in terms of the information and management systems for the PES through executing changes in an orderly, flexible, documented and agile manner.

HOW CAN PLANNING AND ALIGNMENT WITHIN THE ENTERPRISE ARCHITECTURE FRAMEWORK HELP TRANSFORM PES?¹⁵

Designing in the EA framework is the basis of defining the aspects prior to the implementation of information systems, thus enabling their orderly execution. Some of these aspects include the following:

- I. Definition of the program's approach following an established methodology.
- II. Definition of the structure of the programs' work teams.
- III. Definition of program governance including decision-making committees, meeting rules, decision escalation, specification of information to be reported, etc.

15. The document systematizes in several of its chapters the results of the work for developing architectures in PES and Ministries of Labor in Paraguay (2015), Colombia (2019), Mexico (2019), Peru (2019) El Salvador (2019) and Bolivia (2019) among others.

- IV. Suggested procurement and implementation methodology for the projects.
- V. Timing plan (schedule the execution of phases and modules).
- VI. Financial plan for the programs.
- VII. Project files within the programs, including background, current baseline and goals, expected benefits, technical justification of the project, identified risks as well as project schedule and costs.

An example of the application of enterprise architecture as a guide to digital transformation in PES is the job portal and job board as an integrated tool to support job seekers and employers in managing vacancies. The design and implementation of services to job seekers in the enterprise architecture's framework allows implementing the portal in stages, starting with a registration system for job opportunities and job seekers that over time can incorporate new technologies to speed up the work. The basic registration system can deliver information to counselors so they can propose alternatives to job seekers, first manually, then through word search tools, and eventually an intermediation engine, which can be implemented with AI,¹⁶ that generates a match based on skills or job competencies. Subsequently, this system can interoperate with other systems, and thus provide the analysis areas of the Ministry and other entities with reliable and interconnected data that allows

knowledge of what skills the labor market requires, to serve as a guide for job-training policies.

In this way, an employment portal could also be the basis of a labor intermediation system (LIS) that includes private employment services and one of the basis of a labor market information system. Likewise, the appropriate use of the data the portal generates, and in a later phase the LIS, will allow the PES and the State to better understand the labor market and to have important information for their own decisions.

BEST PRACTICES FOR DESIGNING AN ENTERPRISE ARCHITECTURE

Designing the enterprise architecture before implementing information and management systems generates greater certainty about the results. Some good practices are:

- Incorporate quick wins to generate motivation and early results.
- Involve strategic areas such as planning, finance, operations and processes at the highest possible decision-making levels.
- Identify all key players and their roles in designing and implementing the enterprise architecture.
- Shape the programs resulting from the design with clarity and maintain consistency with new initiatives.
- Align the vision, mission, objectives and main processes of the PES.

- Pay special attention to data flow, database design and comprehensive management of sensitive data and data security.
- Use documentation tools, training and adoption of architecture concepts to ensure proper design and planning.
- Ensure the readiness of the work teams that will be impacted by the transformation programs derived from implementing the enterprise architecture.

PRACTICAL CONCEPTS¹⁷

To facilitate the implementation of information systems, it is important to understand the concepts surrounding new technologies. In that sense, the systems' different layers must be identified and maintained to ensure their sustainability. The three layers are called Front, Middle and Back, and they are complemented by orchestration, integration, data quality and analysis layers.

The functions within the different layers are described below.¹⁸

- **A) Front Systems:** Contain the capabilities by which users interact with the organization's services and processes. They are the input means for executing products and services.
- **B) Middle Systems:** Contain the intermediate business capabilities that support the communication between them and those with

17. Based on experience in 5 countries in the region.

18. Definitions of each layer were retrieved from TOGAF standard. Version 9.2.

which the user interacts, as well as with other capabilities that support functionality.

- **C) Back Systems:** Contain the capabilities and functionalities that support the development of process activities. These capabilities confirm and process what the Front requests.
- **D) Integration Systems:** Contain the capabilities and functionalities that allow interoperability with external services.
- **E) Orchestration Systems:** Support implementing the integration architecture pattern. Their objective is to establish a framework (protocols, design and methodology) on which the new systems must be built.
- **F) Data Quality:** Describe the capabilities to forecast, manage and improve the quality attributes of the entity's information, such as consistency, completeness, reliability and integrity, among others.
- **G) Analysis Spaces:** Contain the capabilities that analyze, interpret and deliver statistical reports, lists and other reports that facilitate decision making and that include reports, big data, business intelligence and business analytics.

CHARACTERISTICS OF INFORMATION SYSTEMS WITH ENTERPRISE ARCHITECTURE DESIGN

Digital transformation processes have certain characteristics that generate benefits over time. Among them, the ones that stand out are modularity, scalability, interoperability and the best-of-breed approach.

- **Modularity:** Allows information and management systems for PES to be implemented according to established priorities, making it possible for modules to be adapted without affecting the system's overall functioning. Modularity makes it possible to generate early wins.
- **Scalability:** Provides adaptability according to the circumstances, without losing product quality. Information systems are scalable when it is possible to manage their growth without having to change parts. It is important to design systems in layers to achieve scalability.
- **Interoperability:** Allows access to data from other institutions or areas, as well as contributing to making data from PES information systems available to other institutions. Interoperability is essential for information to be integrated and interconnected.¹⁹

19. For more information on the benefits of interoperability for social services see Pombo et al. (2019).

- **Best-of-breed approach²⁰** : The best-of-breed development strategy it possible to combine custom developments with purchased components or services available on cloud platforms, which combines the best component for each desired function.

CONCLUSIONS

PES play a key role in labor intermediation, serving as the basis of the business value chain. They also offer an access route to employability programs for active job seekers through internships and dual training programs that facilitate their integration into the labor market.

The digital transformation of a PES allows the institution to position itself as a competitive entity and achieve a greater impact on citizens due to its wide coverage and diversity of services.

Not implementing a long-term enterprise architecture in PES can lead the organization to slow down its digital transformation, given that there is a risk that the strategic goals, processes and institutional resources might not be aligned when implementing technologies that help make the offered services more efficient for all users.

In general, a well-designed and implemented enterprise architecture can facilitate leveraging technology's benefits to automate PES processes. Consequently, the services the PES offers can automatically correct inequalities within the labor market, such as gaps between required and offered skills,

detect poor quality jobs and increase access to information on specific jobs in different areas of a country, among others.

The benefits previously mentioned can be replicated in other countries and cities, whether in urban or rural areas, having a positive impact on the region and making it attractive for future employers who want to invest in the area. This is possible thanks to the supply of the skilled labor the digital PES creates.

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